PEDIATRIC LEAD POISONING

Clinical features: The common warning signs of lead poisoning such as headache, stomachache, fatigue, loss of appetite or sleep disturbances, can easily be mistaken for common childhood problems. Most children have no symptoms of lead poisoning until the blood lead levels are very high. A blood lead test is the only way to tell if a child has an elevated blood lead level and is recommended as part of standard pediatric check-up. Blood lead testing is mandated as part of Kan Be Healthy health assessment for children under six receiving Medicaid benefits.

Causative agent: Children under the age of six most often become lead-poisoned by ingesting lead contaminated dust through frequent hand-to-mouth activity typical of this age group such as thumb-sucking, chewing on toys, pacifiers, and other objects that have been in contact with dust and soil. Lead-based paint in homes built before 1978 is the most common source of lead exposure for children when painted surfaces are peeling, deteriorating, or disturbed during renovation or remodeling. Other potential sources of lead poisoning include water from leaded pipes, occupational or hobby exposure of the parent, soil contaminated from previous industry and leaded gas emissions, and food contaminated by imported dishes or cans containing lead. Children are considered to be at high risk for lead poisoning if they:

- Live in or visit a house or apartment built before 1960? (This could include a day care center, preschool, the home of a baby-sitter or relative, etc.)
- Live in or regularly visit a house or apartment built before1960 with previous, ongoing or planned renovation or remodeling?
- Have a family member with an elevated blood lead level?
- Interact with an adult whose job or hobby involves exposure to lead? (Furniture refinishing, making stained glass, electronics, soldering, automotive repair, making fishing weights and lures, reloading shotgun shells and bullets, firing guns at a shooting range, doing home repairs and remodeling, painting/stripping paint, antique/imported toys, and making pottery)
- Live near a lead smelter, battery plant or other lead industry? (Ammunition/explosives, auto repair/auto body, cable/wire striping, splicing or production, ceramics, firing range, leaded glass factory, industrial machinery/equipment, jewelry manufacturer or repair, lead mine, paint/pigment manufacturer, plumbing, radiator repair, salvage metal or batteries, steel metalwork, molten metal, or foundry work)
- Use pottery, ceramic, or crystal-wear for cooking, eating, or drinking?"

Mode of transmission: The pathways to lead exposure are inhalation and ingestion.

Incubation period: Lead poisoning is not an infectious disease.

Period of communicability: None

Public health significance: Lead poisoning is a preventable pediatric health problem affecting Kansas' children. In young children lead levels can affect the developing nervous system, resulting in delayed development, decreased IQ, and learning and behavior problems. High levels of lead poisoning (greater than 20 µg/dL) can have adverse effects on the kidneys and blood-producing organs as well as the digestive and reproductive systems. Very high blood lead levels (greater than 70 µg/dL) can cause devastating health consequences, including seizures, coma and death. The developing fetus is very susceptible to lead exposure and blood lead levels of the mother. Early identification and treatment of lead poisoning reduces the risk that children will suffer permanent damage. According to the Kansas Blood Lead Testing guidelines, child health care providers shall use a blood lead test[1] to screen the following children:

- Child is 12 or 24 months of age[2],
- Child under 6 years of age who has never received a blood lead test[3]
- Child is receiving a Kan-Be-Healthy physical assessment[3],
- Child receives services from Social and Rehabilitation Services (SRS) , Women, Infants and Children (WIC), FirstGuard Health Plan (FG), HealthWave or HealthConnect,
- Child lives within the high-risk (gray on map) areas in Hutchinson, Kansas City, Overland Park, Salina, Topeka, or Wichita.
- Child does not fit the criteria above, but parent/guardian answers "Yes" to any of the following questions[4]:

  "Does your child…
  - Live in or visit a house or apartment built before 1960? (This could include a day care center, preschool, the home of a baby-sitter or relative, etc.)
  - Live in or regularly visit a house or apartment built before 1960 with previous, ongoing or planned renovation or remodeling?
  - Have a family member with an elevated blood lead level?
  - Interact with an adult whose job or hobby involves exposure to lead? (Furniture refinishing, making stained glass, electronics, soldering, automotive repair, making fishing weights and lures, reloading shotgun shells and bullets, firing guns at a shooting range, doing home repairs and remodeling, painting/stripping paint, antique/imported toys, and making pottery)
  - Live near a lead smelter, battery plant or other lead industry? [Ammunition/explosives, auto repair/auto body, cable/wire striping, splicing or production, ceramics, firing range, leaded glass factory, industrial machinery/equipment, jewelry manufacturer or repair, lead mine, paint/pigment manufacturer, plumbing, radiator repair, salvage metal or batteries, steel metalwork, or molten metal (foundry work)]
  - Use pottery, ceramic, or crystal wear for cooking, eating, or drinking?"

[1]A blood lead test for lead poisoning is a laboratory analysis for lead in the blood of a child or adult.

[2]Recommended by the American Academy of Pediatrics and the Centers for Disease Control and Prevention.

[3]Centers for Medicare and Medicaid Services (CMS) and the Kansas Department of Social and Rehabilitation Services (Kan Be Healthy) require a blood lead test at 12 and 24 months. Children between the ages of 36-72 months of age must receive a blood lead test if they have not been previously screened for lead poisoning.

[4]The risk questionnaire is critical to finding children who are not subject to targeted screening owing to risk factors such as Medicaid eligibility or pre-1960 housing. One
positive response to any of the questions requires a blood lead test at this time.

Reportable disease in Kansas since: Effective December 2002, laboratories are required to submit all blood leads test.

Clinical Criteria: None

Laboratory Criteria for Surveillance Purposes

- One venous BLL ≥10 µg/dL , ***OR***
- Two BLLs of ≥10 µg/dL within 12 weeks (capillary or venous).

Surveillance Case Definitions

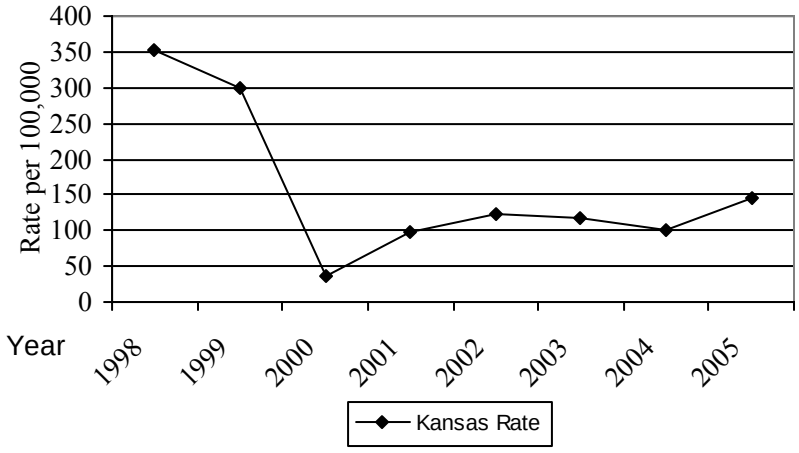
- *Confirmed:* a case that is laboratory confimed.

Epidemiology and Trends

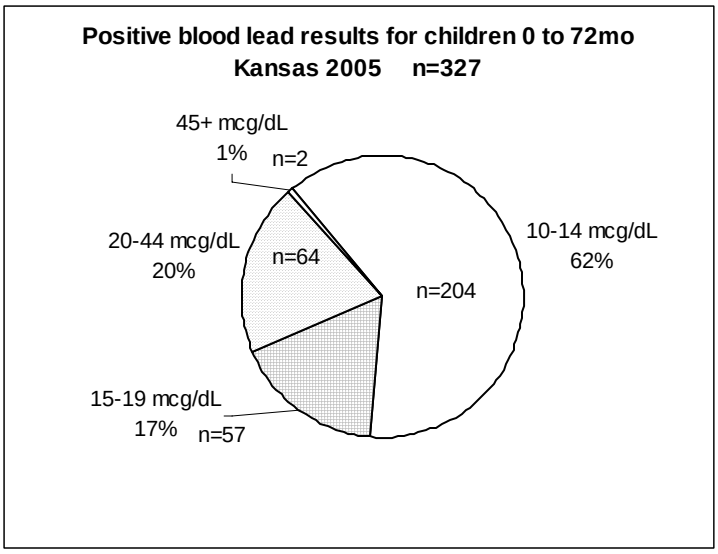
2005 Kansas Count: 327*

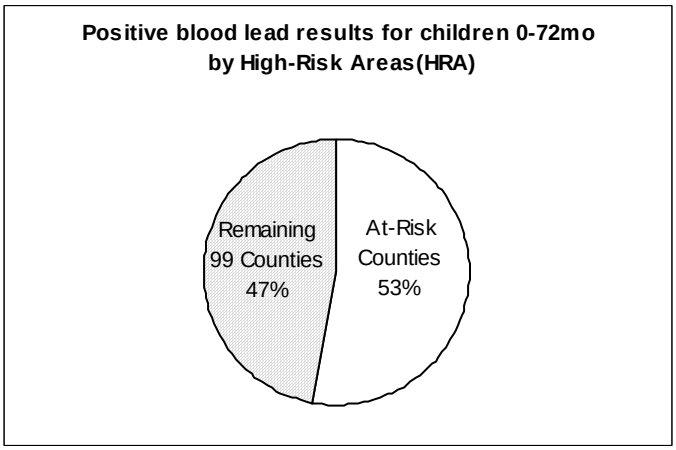
	Rate per 100,000
Kansas Rate	12.0
U.S. Rate (2004)	*NA*
Gender	
Male	13.4
Female	10.5
Race	
White	3.4
Black	13.3
Ethnicity	
Hispanic	18.2
Non-Hispanic	1.2
Geographic area	
Urban County	11.0
Non-Urban County	12.9

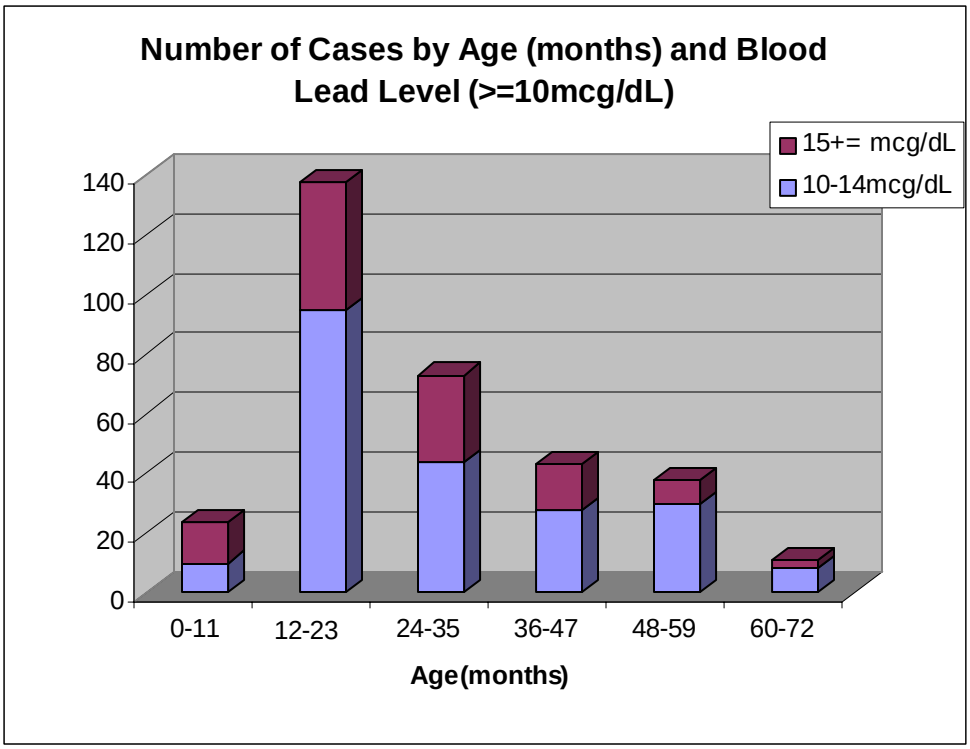
(Pediatric Lead Poisoning) rate by year
1998 - 2005

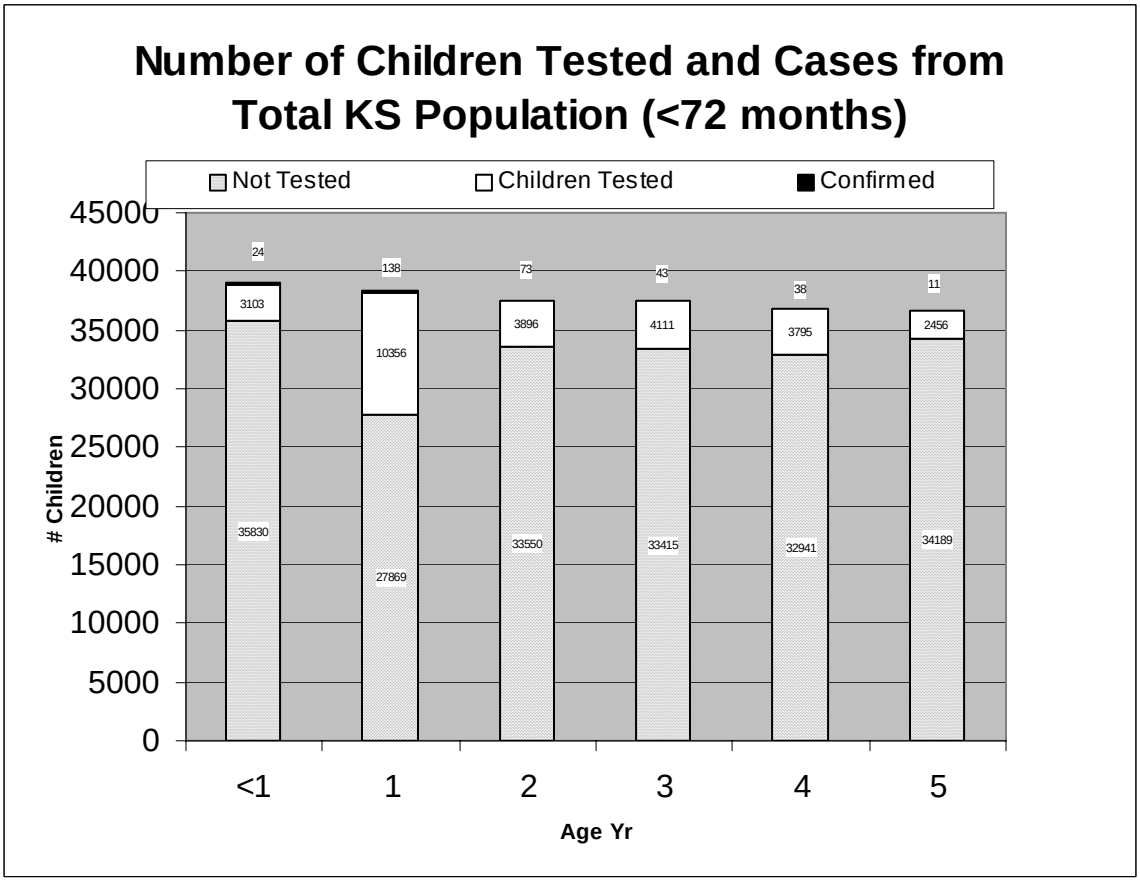


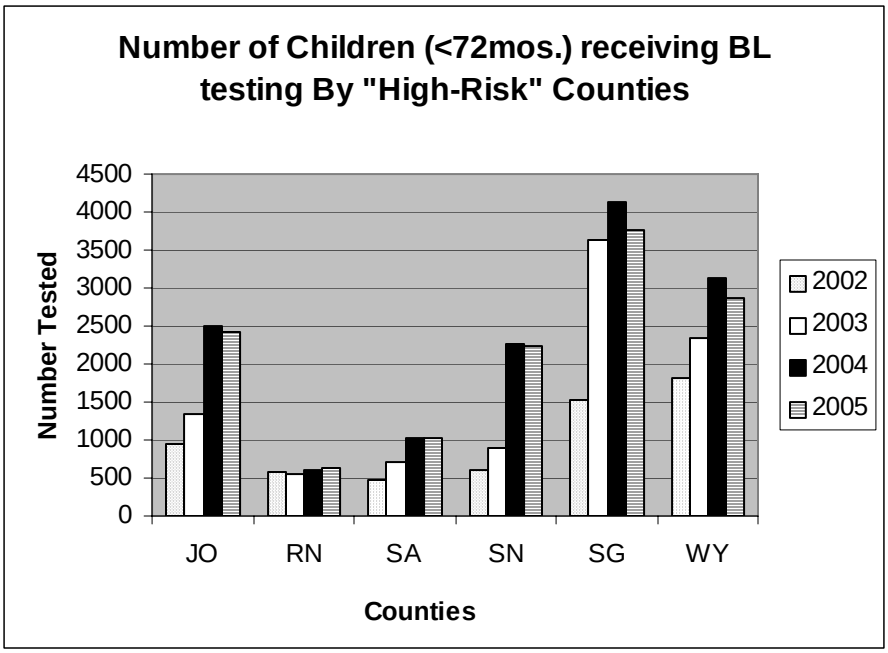
* Pediatric lead poisoning data is maintained by the Kansas Childhood Lead Poisoning Prevention Program (KCLPPP). See http://www.unleadedks.com/


Positive blood lead results for children 0 to 72mo
Kansas 2005 n=327
45+ mcg/dL
1%
n=2
10-14 mcg/dL
62%
n=204
20-44 mcg/dL
20%
n=64
15-19 mcg/dL
17%
n=57


Positive blood lead results for children 0-72mo
by High-Risk Areas(HRA)
Remaining
99 Counties
47%
At-Risk
Counties
53%


Number of Cases by Age (months) and Blood Lead Level (>=10mcg/dL)
15+= mcg/dL
10-14mcg/dL
140
120
100
80
60
40
20
0
0-11
12-23
24-35
36-47
48-59
60-72
Age(months)


Number of Children Tested and Cases from Total KS Population (<72 months)
Not Tested
Children Tested
Confirmed
Children
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
24
3103
35830
138
10356
27869
73
3896
33550
43
4111
33415
38
3795
32941
11
2456
34189
<1
1
2
3
4
5
Age Yr



The number of children <72 months of age screened in 2004 was 27,723 compared to 27,717 in 2005. No major increase of children screened occurred due to screening rate dropping nearly 30% for various Medicaid programs. In 2005, the number of **confirmed** pediatric lead poisoning cases reporting in children <6 years old was 327, a increase of 105 cases from 2004. A factor in the increase of identified cases may be due to revisions made to the Kansas Testing and Case Management Guidelines and follow up contacts made for children with blood lead levels $\geq$10µg/dL to be retested.

The age range of confirmed cases was from 0-71 months. The 12-23 month age group accounted for 42% of the reported cases and the 24-47 month age group represented 22% of the pediatric lead cases. The ratio of male to female is about one to one. There were 66 cases (20.2%) with a blood lead level $\geq$20µg/dL, a level that might warrant an environmental risk assessment.

A targeting model was developed to determine "High-Risk" areas using four population-density variables: 1) minority population, 2) impoverished population, 3) children age five and under, and 4) housing density of pre-1960 construction. The six "High-Risk" counties were identified as Johnson, Reno, Saline, Sedgwick, Shawnee, and Wyandotte. These six counties account for 50% of **confirmed** pediatric lead cases.